KGS Code

KGS AA336 2018

Code for Facilities, Technology and Inspection for Manufacturing of Brass Ball Valves

Deliberation/Resolution by Gas Technical Standards Committee : November 23, 2018

Approval by the Ministry of Trade, Industry & Energy : December 13, 2018

Personnel

Gas Technical Standards Committee

Chairman	Kwang-Won Lee, Professor of Hoseo University
Vice-Chairman	Seung-Hoon Nam, Principal Researcher of KRISS
Ex Officio Member	Hui-Won Lee, Manager of Energy Safety Department, Ministry of Trade, Industry & Energy
	Hae-Myeong Yang, Director of Technology and Safety, Korea Gas Safety Corporation
High-Pressure Gas	Seung-Hoon Nam, Principal Researcher of KRISS
	Beom-Seok Lee, Principal Professor of Kyung Hee University
	Dong-Myeong Ha, Professor of Semyung University
	Chang-Gi Kim, Principal Researcher of Korea Institute of Machinery and Materials
	Hyuk-Myun Kwon, Director General of Occupational Safety & Health Research Institute
	Su-Dong Byun, CEO of Q-Best
Liquefied Petroleum Gas	Doo-Seon Park, Managing Director of Daesung Industrial Gas Co., Ltd
	Hyeong-Hwan Ann, Professor of Korea National University of Transportation
	Byeong-Hak Choei, Professor of Gangneung-Wonju National University
	Seong-Min Lee, Director of KOGAS Research Institute
	Yong-Gwon Lee, Vice-President of EG CNE Co.,Ltd
	Gi-hyeon Jang, Director of Kiturmi
	Jeong-Sik Chon, Direto of E1 CO., Ltd.

History of Establishment and Revision of KGS Code	
Code Number	KGS AA336[2017]
Code Title	Code for Facilities, Technology and Inspection for Manufacturing of Brass Ball Valves

Date of Establishment/Revision	Description
December 28, 2012	Established (Notification of the Ministry of Knowledge Economy No. 2012-549)
April 3, 2014	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2014-141)
November 17, 2014	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2014-589)
December10, 2015	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2015-641)
January8, 2016	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2016-6)
December 15, 2016	Revised (Notification of the Ministry of Trade, Industry & Energy, No. 2016-638)
November 20, 2017	Revised (Notification of the Ministry of Trade, Industry & Energy, No. 2017-542)
December 13, 2018	Revised (Notification of the Ministry of Trade, Industry & Energy No. 2018-607)

Table of Contents

Code for Facilities, Technology and Inspection for Manufacturing of Brass Ball Valves

1. General

1.1 Scope

This Code applies to the facilities, technology and inspection for manufacturing of brass ball valves (restrictive to brass ball valves for liquefied petroleum gas or city gas piping; hereinafter referred to as "valves") among the other valves in conformity to the Enforcement Regulation of the Safety Control and Business Regulation of Liquefied Petroleum Gas Act (hereinafter referred to as "Enforcement Regulation"), Table 3, No. 6 and Table 7, No.4-f.<Revised on December 10, 2015>

1.2 Validity of Code

1.2.1 This Code has passed the deliberation and resolution by Gas Technical Standards Committee (Bill No. 2018-9, November 23, 2018) in conformity to the High Pressure Gas Safety Control Act (hereinafter referred to as "High Pressure Gas Act"), Article 33-2 in accordance with the Safety Control and Business Regulation of Liquefied Petroleum Gas Act (hereinafter referred to as "Act"), Article 45, Clause1, has been approved by the Minister of Trade, Industry & Energy (Notification No. 2018-607 of the Ministry of Trade, Industry & Energy, December 13, 2018) and is valid and effective as the detailed standards in conformity to the Act, Article 45, Clause 1.

1.2.2 Conformity to this Code is deemed to conform to Table 7 of the Enforcement Regulation in accordance with the Act, Article 45, Clause 4.<Revised on December 10, 2015>

1.3 Reference Codes and Standards

1.3.1 Inspection standard for new technology products

In case the Minister of Trade, Industry & Energy acknowledges that the new manufacturing and inspection methods of valves developed through new technology development do not meet the standard for facilities, technology and inspection conforming to this Code in accordance with the Enforcement Regulation, Table 7, No. 5-a but do not hinder safety control, such manufacturing

and inspection methods of those gas appliances may apply only restrictively to them. <Revised on December 15, 2016>

1.3.2 Registration standard for manufacturing foreign products

The "foreign manufacturing installation standards and manufacturing technology standards" specified in the Enforcement Regulation, Article 17, proviso of Clause 3 mean the detailed standards specified by the Act, Article 45. <Revised on December 10, 2015>

1.4 Definitions

The terms used in this Code are defined as follows:

1.4.1"Regular quality inspection" means the performance inspection performed by taking samples from products manufactured in mass production to check whether the products which are to undergo production stage inspection are the same products manufactured as those that have undergone design stage inspection.

1.4.2"Routine sample inspection" means the inspection performed to check on the basic product performance by taking samples from the same products manufactured in the same production lot for the products to undergo product identification inspection.

1.4.3"Occasional quality inspection" means the inspection performed by taking samples without any advance notice from products produced in mass production in order to check whether the products which have undergone production process inspection or comprehensive process inspection are being manufactured in the same way as those that have undergone design stage inspection.

1.4.4"Process identification audit" means the audit conducted to check on the conformity of quality system operation to the manufacturing and self-inspection processes required for manufacturing of the products which have undergone design stage inspection.

1.4.5"Comprehensive quality control system audit" means the audit conducted to check on the conformity of quality system operation for the whole manufacturing process of valves such as design, manufacturing and self-inspection.

1.4.6"Type" means the unit of products distinguishable in their construction, material, capacity and performance.

1.4.7 "Process inspection" means production process inspection and comprehensive process inspection.

1.4.8 "Normal pressure" is the reference pressure for pressure-proof test pressure and gas tightness test pressure and is the maximum working pressure applied to each part in service.

1.4.9 "Nominal pressure' is to designate the pressure classification of valves and is indicated as "K". "K" shall conform to KS B 2308. <Newly established on December 15, 2016>

1.4.10 "Ball valve of shutoff device direct connection type" is a valve which is used as a part of a gas leak alarm shutoff device and is operated by its valve stem which is directly connected to the shutoff part of the alarm shutoff device <Newly established on April 3, 2014>.

1.5 Application of Codes and Standards

The materials, construction and dimensions and other technical standard of the valve not covered in this Code shall conform to relevant Korean Industrial Standards (KS).

1.6 Interim Measures (currently not used)

2. Manufacturing Installation Standard

2.1 Manufacturing Facilities

A person who intends to manufacture valves shall be furnished with the following manufacturing facilities in conformity to the following standard to manufacture valves in accordance with this manufacturing standard. However, in case the authority in charge of the license recognizes that it is necessary for quality improvement, the facilities of specialist parts companies which are used for the manufacturing of the parts may be utilized or the parts manufactured by them may be used.

(1) Drilling machines, outside diameter cutting machines, inside diameter cutting machines, threading machines, varnishing machines, cast machining facilities, melting facilities, casting facilities, heating furnaces and forging presses,

(2) Ultrasonic cleaning facilities, and

(3) Power assembly jigs and tools for valve assembly

2.2 Inspection Facilities

2.2.1 A person who intends to manufacture valves shall be furnished with the following inspection facilities in conformity to the following standard to check on and maintain product performance:

2.2.1.1 The kinds of inspection facilities shall be sufficient for self-inspection in conformity to safety control regulations and be as follows:

2.2.1.1.1Kinds of inspection facilities which must be furnished

(1) Dimension measurement instruments such as vernier calipers, micrometers, threads gauge, etc.,
(2) Thermostatic bath, precision scales and immersion facilities, <Revised on April 3, 2014>
(3) Pressure-proof test facilities,
(4) Gas tightness test facilities,
(5) Torque meters, and
(6) Ball sphericity gauges such as 3-D gauges<Newly established on April 3, 2014>

2.2.1.1.2Kinds of inspection facilities which shall be furnished when required

(1) Durability test facilities,
(2) Axis line deviation meters, and<Revised on April 3, 2014>
(3) Other necessary inspection facilities and apparatuses.

2.2.1.2 The capacity of inspection facilities shall match the product production capacity of the relevant manufacturing plant.

2.2.2 Notwithstanding 2.2.1, in case the test and inspection of design stage inspection items are ordered to one of the following authorized agencies to be performed or a lease contract for test and inspection facilities required for design stage inspection items is awarded to one of the following authorized agencies, the relevant test and inspection facilities among the inspection facilities in 2.2.1 shall be deemed to have been furnished.
(1) Korea Gas Safety Corporation (hereinafter referred to as "KGS" or "Korea Gas Safety Corporation") in conformity to the High Pressure Gas Act, Article 28
(2) Test and inspection agencies authorized in accordance the High Pressure Gas Act, Article 35 (hereinafter referred to as "test and inspection agencies")
(3) Test and inspection agencies authorized in accordance with the Framework Act on National Standards

3. Manufacturing Technology Standard

3.1 Design (currently not used)

3.2 Materials

The materials of valves shall conform to the following standards to secure their safety.

3.2.1 The material of nuts which fix valve handles shall be a corrosion-resistant material or a material of which surface is treated for corrosion resistance.

3.2.2 The surface of the ball of a ball valve shall be chrome-plated to a thickness not less than 5 ㎛. However, in case a corrosion-resistant material in conformity to KS D 3706 (Stainless Steel Bars) is used, this provision shall not apply.

3.2.3 The materials used in valve bodies and covers shall conform to those specified in Table 3.2.3, be the materials of acceptable specification or those which have equivalent chemical composition and mechanical property.

Table 3.2.3 Materials Used in Valves

Part	Specification
Body	C3712 or 3771 of KS D 5101,
Cover	CAC201, CAC202, CAC203 or CAC406 of KS D 6024
Ball	C3602, C3604, C3604, 3712 or 3771 of KS D 5101
Valve Stem	CAC201, CAC202, CAC203 or CAC406 of KS D 6024 STS304 of KS D 3706, SSC13 of SPS-KFCA-D4103-5006*<Revised on January 8, 2016>

3.3 Thickness

3.3.1 The thickness of the central part of a ball shall not be less than the thickness of the body when measured as shown in Figure 3.3.1

---

*Alternative standard in accordance with the policy of national standard transfer to group standard of Korea Agency for Technology and Standards(KATS)

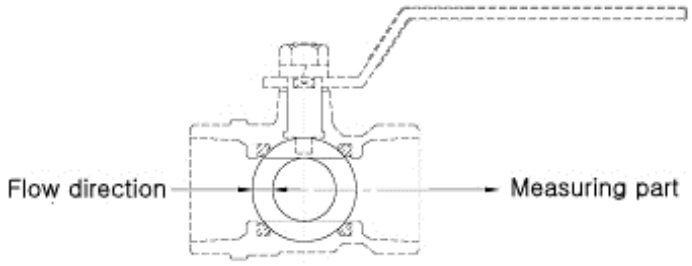


Figure 3.3.1 Thickness Measuring Part of Central Part of Ball

3.3.2 The thickness of the valve body shall conform to Table 3.3.2. <Newly established on November 20, 2017 >

Table 3.3.2 Thickness of Valve Body

Nominal Diameter	8	10	15	20	25	32	40	50	65	80	100
Minimum body thickness	1.4	1.6	2.0	2.0	2.0	2.3	2.6	3.0	3.5	3.8	4.3

3.4 Construction and Dimensions

A valve shall be of a construction and dimensions in conformity to the following standard for its safety, serviceability and exchangeability.

3.4.1 In case the body and cover of a valve are assembled with screw threads, the threading shall conform to KS B 0201 (Metric Coarse Screw Threads) or KS B 0204 (Metric Fine Screw Threads).

3.4.2 The O-rings and packings of a valve shall have no abnormality such as abrasion.

3.4.3 The opening direction of a valve handle wheel shall be counterclockwise. However, this provision does not apply to a valve directly connected to the shutoff device.. <Revised on April 3, 2014>

3.4.4 The surface of a valve shall be smooth and free of corrosion, cracks, wrinkles, flaws, forging defects and slag inclusion.

3.4.5 The body parts of a ball valve in contact with O-rings shall be smooth and glossy.

3.4.6 The out-of-roundness of the ball of a ball valve shall not be over 30 μm, the end edges of the ball hole shall not be sharp and the hole diameter of the ball shall conform to Table 3.4.6. <Revised on November 20, 2017 >

Table 3.4.6 Hole Diameter of Ball <Newly established on November 29, 2017 >

Nominal Diameter	8	10	15	20	25	32	40	50	65	80	100
Minimum Hole Diameter	6	8	10	15	20	25	32	40	50	65	80

3.4.7 When a force not exceeding 294.2 N is applied at the end part of the handle of a ball valve and it is turned 90 degrees, the ball valve shall be completely opened or closed. However, a ball valve of shutoff device direct connection type shall be of a construction which is completely opened and closed and the detailed specification for this construction shall conform to the manufacturer's specification. <Revised on April 3, 2014>

3.4.8 When a valve is completely opened, the direction of the handle and the direction of the flow passage shall be parallel, and the ball hole shall be in line with the flow passage.

3.4.9 The deviation of the thread axes of both ends of a threaded type valve from the straight line connecting the thread centers of both ends shall not exceed 2.0 mm at a distance of 300 mm from the end surface.

3.4.10 The pipe connection part of a thread type valve shall be female-threaded and the threads shall be taper pipe threads.<Revised on April 3, 2014>

3.4.11 In case a connection part is of a flanged type, the flange shall conform to KS B 1511 (Basic Dimensions of Ferrous Material Pipe Flanges).

3.4.12 The stem of a valve shall not be separated from the valve when its gland flange bolts or external parts are removed while the valve is under internal pressure.

3.4.13 The color of the valve handle shall be yellow. <Newly established on April 3, 2014>

3.4.14 The diameter of the valve stem shall conform to Table 3.4.14. <Newly established on November 20, 2017>

Table 3.4.14 Diameter of Valve Stem <Newly established on November 20, 2017 >

Nominal Diameter	8	10	15	20	25	32	40	50	65	80	100
Minimum Diameter of Valve Stem	5.9	5.9	6.9	7.9	10.9	10.9	10.9	14.9	14.9	16.9	16.9

3.5 Fabrication (currently not used)

3.6 Welding (currently not used)

3.7 Heat Treatment (currently not used)

3.8 Performance

A valve shall have the performance in conformity to the following standard to secure its safety and serviceability:

3.8.1 Product performance

3.8.1.1 Pressure-proof performance<Revised on April 3, 2014>

When hydrostatic pressure not less than 1.5 times the normal pressure or 3 MPa, whichever is greater, is applied for no less than one minute while the valve is 50% opened, there shall not be any abnormality.

3.8.1.2 Gas tightness performance

3.8.1.2.1 High-pressure seat leakage performance

When a valve is closed after being filled with water and hydrostatic pressure not less than 1.1 times the normal pressure or 1.76 MPa, whichever is greater, is applied, there shall not be any abnormality.

3.8.1.2.2 Low-pressure seat leakage performance

When a pressure of 0.4 to 0.7 MPa is applied to the valve from its inlet side with air or nitrogen for no less than 1 minute, the valve shall not leak. <Revised on November 20, 2017>

3.8.1.2.3 Body gas tightness performance<Revised on April 3, 2014>
When a valve is pressurized to a pressure not less than 1.1 times the normal pressure with air or nitrogen for no less than 1 minute while the valve is 50 % opened, there shall not be any leakage.

3.8.1.3 Durability performance
A threaded type valve of which nominal diameter is 25 A or less and normal pressure does not exceed 2.94 MPa shall be free of leakage in gas tightness test after it has been opened and closed 6,000 times at a speed not exceeding 10 times per minute.

3.8.2 Material performance

3.8.2.1Gas resistance performance(see Appendix B1 for test method)

3.8.2.1.1 The O-ring, seat ring, packing and nonmetallic parts in contact with gas of a valve for liquefied petroleum gas service shall be free of softening, swelling, hardening, etc. when visually checked after being left for no less than 24 hours in each of liquefied petroleum gas at -20 ℃, liquefied petroleum gas at 40 ℃ and air at -25 ℃. The rate of mass change (absorption rate and extraction rate) shall be in the range of -8 % to +5 %.

3.8.2.1.2 The O-ring, seat ring, packing and nonmetallic parts in contact with gas of a valve for city gas service shall be free of softening, swelling, hardening, etc. when visually checked after being left for no less than 70 hours in iso-octane at a temperature between 40 ℃ and 45 ℃. The rate of mass change (absorption rate and extraction rate) shall be in the range of -8 to +5%.

3.8.2.2 Copper-hydrogen embrittlement test
In the case of a valve of which body and cover are made of a material subject to the aging crack test in KS D 5101 (Copper and Copper Alloy Rods and Bars), no cracks shall be generated when the valve is immersed in mercurous nitrate solution for 30 minutes. In this case, one liter of the mercurous nitrate solution shall contain 10 g of mercurous nitrate and 10 ml of nitric acid (specific gravity: 1.42). <Revised on December 15, 2016>

3.8.3 Operating performance

3.8.3.1 Opening and closing performance
The opening and closing of each valve part shall be smooth.

3.9 Marking
A valve shall be marked in accordance with the following standard for its safe service.

3.9.1 Product marking

3.9.1.1 Matters to be marked on the body (to be engraved)

(1) Name or symbol of manufacturer

(2) Gas flow direction (The cover side shall be the outlet.)

(3) Nominal diameter (A designation)

(4) Country of origin

(5) Service (to be marked with "LPG" or "G") <Newly established on April 3, 2014>

3.9.1.2 Matters to be marked on the body or handle

(1) Manufacturing number or lot number,

(2) date of manufacturing <Revised on December 13, 2018>

(3)<Deleted on April 3, 2014>

(4) Warranty period

(5) Normal pressure or working pressure <Revised on December 15, 2016>

(6) Opening and closing directions (exclusive of ball valves of shutoff device direct connection type). <Newly established on April 3, 2014>

3.9.2 Acceptance mark

A valve shall be marked with a following acceptance mark to be easily identified as the valve which has passed the inspection in accordance with the Act, Article 39, Clause 2. <Revised on December 10, 2015>

3.9.2.1 An acceptance mark shall be stamped with a die stamp ( ) of which outside diameter is 5 mm for a ball valve of which size is less than 200 A and with a die stamp ( ) of which outside diameter is 10 mm for a ball valve of which size is not less than 200 A. <Revised on December 15, 2016>

3.9.2.2 In case valves are manufactured in an integrated production process, the acceptance mark may be marked in their production process.

4. Inspection Standard

4.1 Kinds of Inspections

Gas appliance inspections are classified into manufacturing installation inspection and product inspection.

4.1.1 Manufacturing installation inspection

The manufacturing installation of a person who intends to manufacture valves in accordance with the Act, Article 36, Clause 2 shall undergo manufacturing installation inspection when the installation or modification of the valve manufacturing installation has been completed. <Revised on December 10, 2015>

4.1.2 Product inspection

A person who intends to manufacture or import valves in accordance with the Act, Article 39, Clause 1 shall undergo the following inspections in order to check on and maintain the performance of the valves. However, inspection of the gas appliances specified in the Enforcement Decree may be omitted in whole or in part.<Revised on December 10, 2015>

4.1.2.1 Design stage inspection

In case a product comes under one of the following cases in accordance with the Enforcement Regulation, Table 7, the product shall undergo design stage inspection. However, in case the test report certified by Korea Gas Safety Corporation or an authorized test and inspection agency is submitted, the design stage inspection of the relevant part may be exempted.

(1) A gas appliance manufacturer manufactures a specific type of product for the first time.

(2) A gas appliance importer imports a specific type of product for the first time.

(3) The material or construction of the product of which type has undergone design stage inspection is changed and the performance of the product is changed.

(4) The product type has undergone design stage inspection but five years have elapsed from its last inspection date.

4.1.2.2 Production stage inspection

The valves of which type has passed design stage inspection in accordance with the Reinforcement Regulation, Table 7 shall undergo production stage inspection in accordance with the following provisions. In this case, one of product identification inspection, production process inspection or comprehensive process inspection in conformity to Table 4.1.2.2 may be selected as the production stage inspection and be performed depending on self-inspection capability and quality control capability.

Table 4.1.2.2 Kinds, Units and Intervals of Production Stage Inspections

Kind of Inspection	Object	Composition Item	Inspection Unit	Interval
Product Identification Inspection	Items other than the objects of production process inspection or	Regular quality inspection	Type	Once every 2 months

	comprehensive process inspection	Routine sample inspection	Type	At every application
Production Process Inspection	Items satisfying the conformity requirements of the quality system for manufacturing process /self-inspection process	Regular quality inspection	Type	Once every 3 months
		Process identification inspection	Item	Once every 3 months
		Occasional quality inspection	Representative type	Twice a year or more often
Comprehensive Process Inspection	Items satisfying the conformity requirements of the quality system for total process (design, manufacturing and self-inspection)	Comprehensive quality control system audit	Item	Once every 6 months
		Occasional quality inspection	Representative type	Once a year or more often

4.1.2.2.1 Product identification inspection shall be performed as follows:

(1) Product identification inspections are classified into regular quality inspection and routine sample inspection and each inspection shall be separately performed. In this case, routine sample inspection is performed when the product has passed regular quality inspection.

(2) Products of which type has passed the inspection in accordance with (1) shall undergo regular quality inspection once every two months. However, regular quality inspection is omitted for the products of the same type of which manufactured or imported quantity does not exceed 20 units a month.

(3) Routine sample inspection shall be performed in accordance with (1) for the type of products whenever the application for their inspection is made.

4.1.2.2.2 Production process inspection shall be performed as follows:

(1) Production process inspections shall be classified into regular quality inspection, process identification audit and occasional quality inspection, and each inspection or audit shall be separately performed.

(2) The process identification audit of the product of which audit is applied for shall be performed when the applicant has 3-month or longer implementation experience of the quality system documented in accordance with Appendix A.

(3) Occasional quality inspection shall be performed twice a year or more often without prior notice on the product items which have undergone regular quality inspection and process identification audit.

(4) Occasional quality inspection shall be performed for one representative type of products by the same method as that of regular quality inspection.

(5) A person who has passed comprehensive process inspection may apply for product identification inspection as required.

4.1.2.2.3 Comprehensive process inspection shall be performed as follows:

(1) Comprehensive process inspections shall be classified into comprehensive quality control system audit and occasional quality inspection, and each audit or inspection shall be separately performed.
(2) The comprehensive quality control system audit of the products of which audit is applied for shall be performed when the applicant has 3-month or longer implementation experience of the quality system documented in accordance with Appendix A.
(3) Occasional quality inspection shall be performed once a year or more often without prior notice on the products which have undergone comprehensive quality control system audit.
(4) Occasional quality inspection shall be performed for one representative type of products by the same method as that of regular quality inspection.
(5) A person who has passed comprehensive process inspection may apply for product identification inspection as required.

4.2 Object Audit of Process Inspection

4.2.1 Application for audit

A gas appliance manufacturer who has 3-month or longer gas appliance manufacturing experience in accordance with Appendix A may apply for production process inspection or comprehensive process inspection.

4.2.2 Audit method

The audit is performed for the persons who are to undergo process inspection, who have failed process inspection or who apply for process re-inspection in accordance with 4.4.2.2.2(5).

4.2.2.1 Audit of new applicants, persons who failed process inspection and persons who apply for re-inspection

The audit standard for process identification audit or comprehensive quality control system audit for the persons who apply for process inspection, persons who have failed process inspection or persons who apply for process re-inspection in accordance with 4.4.2.2.2(5) (hereinafter referred to as “process inspection applicants”) shall conform to Appendix A.

4.2.2.2 Regular audit

In the case of process identification audit which is performed once every 3 months and comprehensive quality control system audit which is performed once every 6 months, the maintenance states of the quality system specified in Appendix A such as changes, process management, self-inspection and use of acceptance marks in the period are audited. The audit for production process inspection or comprehensive process inspection is performed as follows:

4.2.2.2.1 Comprehensive process inspections shall be classified into comprehensive quality control system audit and occasional quality inspection, and each audit or inspection shall be separately performed.

4.2.2.2.2 The comprehensive quality control system audit of the products of which audit is applied for shall be performed when the applicant has 3-month or longer implementation experience of the quality system documented in accordance with Appendix A.

4.2.2.2.3 Occasional quality inspection shall be performed once a year or more often without prior notice on the products which have undergone comprehensive quality control system audit.

4.2.2.2.4 Occasional quality inspection shall be performed for one representative type of products by the same method as that of regular quality inspection.

4.2.2.2.5 A person who has passed comprehensive process inspection may apply for product identification inspection as required.

4.2.3 Adjudication committee

Korea Gas Safety Corporation shall establish an adjudication committee as follows to deliberate the matters related to the judgment on acceptance or rejection of the results of production process inspection and comprehensive process inspection.

4.2.3.1 The adjudication committee shall be comprised of no more than 5 members including one chairperson.

4.2.3.2 The members of the committee shall be commissioned by the president of Korea Gas Safety Corporation from among persons who have extensive knowledge and experience in gas safety or quality control and persons who can represent consumers' right to secure open and aboveboard deliberation.

4.2.3.3 Necessary matters concerning the operation of the committee shall be prescribed by the president of Korea Gas Safety Corporation.

4.3 Inspection Items

4.3.1 Manufacturing installation inspection

Valve manufacturing installation inspection shall be performed on the following items in

accordance with the Enforcement Regulation, Table 7 to check whether manufacturing facilities and inspection facilities are fully furnished:

(1) Whether manufacturing facilities in conformity to 2.1 are furnished, and

(2) Whether inspection facilities in conformity to 2.2 are furnished.

4.3.2 Product inspection

Inspection of valves shall be classified into design stage inspection and production stage inspection, and each inspection shall be separately performed in accordance with the Enforcement Regulation, Table 7 to check whether the valves are manufactured in accordance with the manufacturing standard:

4.3.2.1 Design stage inspection

The inspection items of design stage inspection to check whether the valves conform to the manufacturing standard are as follows. However, in case the test report on a part of which performance is certified by Korea Gas Safety Corporation or an authorized test and inspection agency is submitted, the design stage inspection of that part may be exempted. <Revised on December 15, 2016>

(1) Conformity of materials in accordance with 3.2

(2) Conformity of thickness in accordance with 3.3

(3) Conformity of construction and dimensions in accordance with 3.4

(4) Conformity of performance in accordance with 3.8

(5) Conformity of marking in accordance with 3.9

4.3.2.2Production stage inspection

The inspection items of production stage inspection by kinds of inspections to check whether the valves conform to the manufacturing standard are as follows.

4.3.2.2.1 Product identification inspection

(1) Regular quality inspection

(1-1) Conformity of 3.4.2, 3.4.3, 3.4.4, 3.4.7, 3.4.8, 3.4.9, 3.4.10, 3.4.11, 3.4.12 and 3.4.13 in the construction and dimensions in accordance with 3.4 <Revised on December 15, 2016>

(1-2) Conformity of pressure-proof performance in accordance with 3.8.1.1<Revised on January 5, 2012>

(1-3) Conformity of gas tightness performance in accordance with 3.8.1.2

(1-4) Conformity of opening and closing performance in accordance with 3.8.3.1

(2)Routine sample inspection

(2-1) Conformity of 3.4.2, 3.4.3, 3.4.4, 3.4.7, 3.4.8, 3.4.9, 3.4.10, 3.4.11, 3.4.12 and 3.4.13 in the construction and dimensions in accordance with 3.4 <Revised on December 15, 2016>

(2-2) Conformity of gas tightness performance in accordance with 3.8.1.2.2 and 3.8.1.2.3

(2-3) Conformity of marking in accordance with 3.9

(2-4) Conformity of the chemical compositions of body and cover materials in accordance with 3.2.3 (test on one test specimens among sampled test specimens) <Revised on December 15, 2016>

4.3.2.2.2 Production process inspection

(1)Regular quality inspection

The inspection items of regular quality inspection shall conform to 4.3.2.2.1(1).

(2)Process identification audit

The audit items of process identification audit shall conform to Table 4.3.2.2.

(3)Occasional quality inspection

The inspection items of occasional quality inspection shall conform to 4.3.2.2.1(1).

4.3.2.2.3 Comprehensive process inspection

(1) Comprehensive quality control system audit

The audit items of comprehensive quality control system audit shall conform to Table 4.3.2.2.

(2) Occasional quality inspection

The inspection items of occasional quality inspection shall conform to 4.3.2.2.1(1).

Table 4.3.2.2 Audit Items of Process Identification Audit and Comprehensive Quality Control System Audit<Revised on December 10, 2015>

Classification		Audit Item	Application	
			Process Identification Audit	Comprehensive Quality Control System Audit
General	Organization	Securement of organizations with appropriate technical and business capability	○	○
		Possession of a research or development organization to reflect the causes of potential troubles to product design		○
	Quality System	Operation of an appropriate quality system and review of operation results	○	○
	Human Resource	Maintenance of appropriate qualification for employees affecting quality	○	○
	Facilities & Equipment	Securement of facilities and equipment in conformity to product requirements and quality control	○	○
Design	Design & Development	Securement of a design and development system in conformity to product requirements		○
		Verification of product design through analysis of the effects of potential failures and assessment of reliability, and results of output supply		○

		Check on the feasibility of design and development and operation of change procedure		○
Manufacturing	Purchase	Maintenance of an appropriate management system for purchased materials	○	○
		Reflection of the evaluation of suppliers to purchase policy		○
	Production	Possession of a production process in conformity to product requirements and verification of the implementation	○	○
		Possession of acceptance criteria for process approval	○	○
		Verification of process management capability using a statistical technique		○
		Operation of control plan and guidelines for works		○
		Operation of systems for preventive and forecast maintenances and management of production tools		○
		Operation of systems for handling and storing materials and products	○	○
Self-Inspection	Inspection Method & Procedure	Maintenance of methods and procedures for inspection to secure product conformity	○	○
		Maintenance of acceptance criteria for tally data sampling at zero defect level		○
		Maintenance of traceability for determination of measuring devices and guarantee of effective results, and maintenance of a procedure for record management	○	○
		Analysis of measurement system		○
		Self-inspection of the whole items of design stage inspection (once a year)	○	
		Self-inspection of the whole items of design stage inspection (twice a year)		○
	Corrective and Preventive Measures	Management of unconformity items and operation of preventive measures for recurrence prevention	○	○
	Internal Audit	Possession of capability to maintain system conformity	○	○
Obligation	Acceptance Marking	Maintenance of a written management regulation for acceptance marking	○	○
		Maintenance of a separate written regulation for manufacturing acceptance marks		○
	Safety Control	Prevention of accidents due to faulty products and circulation of unconformity products	○	○
Others		Other matters related to maintenance of safety	○	○

4.4 Inspection Method

4.4.1 Manufacturing installation inspection

Manufacturing installation inspection is performed by checking whether manufacturing facilities and inspection facilities in conformity to 4.3.1 are fully furnished. In case all required facilities are fully furnished, the inspection shall be deemed acceptable.

4.4.2 Product inspection

4.4.2.1 Design stage inspection

Design stage inspection shall be performed in accordance with the standard established by the president of Korea Gas Safety Corporation to judge whether each inspection item conforms to the manufacturing standard.

4.4.2.2 Production stage inspection

The inspection method of production stage inspection shall conform to the followings for each inspection item to clearly judge whether the item is manufactured in accordance with the manufacturing standard:

4.4.2.2.1 Product identification inspection

(1) Sampling

(1-1) The number of test specimens for regular quality inspection shall be two.

(1-2) The sampling standard for routine sample inspection shall be as follows:

(1-2-1) The same products manufactured in the same production unit shall form one lot.

(1-2-2) The number of test specimens to be taken from the lot formed in accordance with (1-2-1) shall conform to Table 4.4.2.2.1(1).

Table 4.4.2.2.1(1) Number of Test Specimens for Routine Sample Inspection

Number of Products Forming 1 Lot	10 and less	11 to 100 inclusive	101 to 300 inclusive	301 to 700 inclusive	701 to 3000 inclusive	3001 and over
Number of Test Specimens	All	10 or over	15 or over	20 or over	25 or over	1/100 of the quantity applied for inspection

(2) Judgment on acceptance or rejection

(2-1) Product identification inspection shall be performed by performing both regular quality inspection and routine sample inspection, and the products which have passed both inspections shall be deemed acceptable.

(2-2) Routine sample inspection shall be performed on sampled test specimens. All the products in the lot to which the accepted test specimens belong shall be deemed acceptable, and all the

products in the lot to which the rejected test specimens belong shall be deemed rejected.

4.4.2.2.2 Process inspection

(1)Sampling

The number of test specimens for the regular quality inspection and occasional quality inspection of production process inspection and comprehensive process inspection shall be two.

(2)Judgment on acceptance or rejection

(2-1) Judgment on acceptance or rejection on process inspection applicants

Judgment on acceptance or rejection on production process inspection or comprehensive process inspection for process inspection applicants shall be as follows. In this case, previous inspection results shall be valid until the decision of the adjudication committee meeting is made.

(2-1-1) Korea Gas Safety Corporation shall prepare the report on the results of regular quality inspection and process identification audit or comprehensive quality control system audit and submit it to the adjudication committee.

(2-1-2) The adjudication committee shall deliberate the submitted report and determine its acceptance or rejection. In this case, if it is judged that part of the quality system shall be complemented according to the deliberation results, conditional acceptance may be granted.

(2-1-3) In case a product has passed regular quality inspection by types and process identification audit for the item, the product shall be deemed to have passed production process inspection.

(2-1-4) In case a product has passed comprehensive quality control system audit, the product shall be deemed to have passed comprehensive process inspection.

(2-2) Judgment on acceptance or rejection for regular process inspection

Judgment on acceptance or rejection for the production process inspection performed once every 3 months and the comprehensive process inspection performed once every 6 months shall be made as follows:

(2-2-1) Korea Gas Safety Corporation shall perform regular quality inspection and process identification audit or comprehensive quality control system audit and determine the acceptance or rejection.

(2-2-2) In case a product has passed regular quality inspection by types and process identification audit for the item, the product shall be deemed to have passed production process inspection.

(2-2-3) In case a product has passed comprehensive quality control system audit, the product shall be deemed to have passed comprehensive process inspection.

(2-3) Judgment on acceptance or rejection for occasional quality inspection

Judgment on acceptance or rejection for occasional quality inspection shall be made by Korea Gas Safety Corporation by performing the inspection by the same method as that of regular quality inspection.

(3) Treatment of inspection results

(3-1) Treatment of inspection results of process inspection applicants

The results of the production process inspection or comprehensive process inspection of a process inspection applicant shall be treated as follows:

(3-1-1) In case the inspection results are accepted in their deliberation, Korea Gas Safety Corporation shall issue the acceptance notification to the applicant.

(3-1-2) In case the inspection results are conditionally accepted in their deliberation, the treatment shall conform to the followings:

(3-1-2-1) The applicant shall submit the complement results of the quality control system to Korea Gas Safety Corporation within one month.

(3-1-2-2) Korea Gas Safety Corporation shall review the submitted complement results, and accept the inspection results if it is confirmed that the complements have been completed.

(3-1-2-3) In case the applicant who has been conditionally accepted fails to submit the complement results within the time limit, Korea Gas Safety Corporation shall reject the inspection results.

(3-1-3) In the case of rejection in deliberation, it shall be treated as follows:

(3-1-3-1) Korea Gas Safety Corporation shall notify the details of unconformity to the applicant and then perform product identification inspection.

(3-1-3-2) In case an applicant who has been notified the unconformity intends to undergo production process inspection or comprehensive process inspection, the applicant may apply for production process inspection or comprehensive process inspection after 3 months from the date of the unconformity notification issued by Korea Gas Safety Corporation.

(3-1-3-3) Applicants who have failed comprehensive process inspection may convert the inspection to production process inspection.

(3-2) Treatment of results of regular process inspection

The results of the production process inspection performed once every 3 months and the comprehensive process inspection performed once every 6 months shall be treated as follows:

(3-2-1) In case the inspection results are accepted, Korea Gas Safety Corporation shall inform the applicant of the acceptance of production process inspection or comprehensive process inspection.

(3-2-2) In case the inspection results are rejected, Korea Gas Safety Corporation shall inform the applicant of the details of unconformity, withdraw the conformity notification and then perform product identification inspection.

(3-2-3) In case an applicant who has been notified the unconformity intends to undergo production process inspection or comprehensive process inspection, the applicant may apply for production process inspection or comprehensive process inspection after 3 months from the date of the unconformity notification issued by Korea Gas Safety Corporation.

(3-3) Treatment of results of occasional quality inspection

The results of quality inspections performed occasionally shall be treated as follows:

(3-3-1) In case a manufacturer or an importer fails occasional quality inspection, Korea Gas Safety Corporation shall inform the manufacturer or importer of the details of unconformity and then

perform the second occasional quality inspection.

(3-3-2) The number of test specimens for the second occasional quality inspection shall be twice the number of test specimens for the first occasional inspection.

(3-3-3) In case the manufacturer or importer fails the second occasional quality inspection, the products shall be rejected, product identification inspection shall be performed and collection inspection shall be performed for the relevant type.

(3-3-4) In case an applicant who has been notified the unconformity intends to undergo production process inspection or comprehensive process inspection, the applicant may apply for production process inspection or comprehensive process inspection after 3 months from the date of the unconformity notification issued by Korea Gas Safety Corporation.

(4) Suspension or change of kind of inspection

In case a person who is subject to production process inspection or comprehensive process inspection in accordance with the Enforcement Regulation, Table 7, No.3 intends to suspend the production of an inspection object item for no less than 6 months or to change the kind of inspection, the person shall notify the matter to Korea Gas Safety Corporation and return the acceptance notification.

(5) Process re-inspection

In case a person who is subject to production process inspection or comprehensive process inspection in accordance with the Enforcement Regulation, Table 7, No.3-b and comes under one of the following cases, the person shall undergo production process inspection or comprehensive process inspection again.

(5-1) The location of the business place is changed,

(5-2) A production item is added, or

(5-3) Three years have elapsed from the acceptance date of production process inspection or comprehensive process inspection. However, in case a relevant gas appliance item is added, the period shall be the remaining period of the existing item.

4.5 Other Inspection Standards

4.5.1 Inspection of imported products

In principle, inspection of imported products shall be performed in a place where the importer wants, and the costs and expenses required for inspection such as equipment and material costs shall be borne by the applicant.

4.5.2 Partial omission of inspection

4.5.2.1 In case a person who undergoes production process inspection or comprehensive process inspection adds inspection items, part of process identification audit or comprehensive quality control system audit may be omitted.

4.5.2.2 In case a person whose quality assurance system has been certified by a certification body authorized in accordance with the Quality Management and Safety Control of Industrial Products Act applies for production process inspection or comprehensive process inspection, part of process identification audit or comprehensive quality control system audit may be omitted.

4.5.3 Disposal of rejected products (not applicable)

4.5.4 Detailed inspection standards

Other detailed matters necessary for design stage inspection and production stage inspection shall conform to what the president of Korea Gas Corporation specifies.

Appendix A General Standard for Operation of Quality Control System for Gas Appliance Manufacturing Plants

1. Introduction	
	A. This standard has been established so that gas appliance manufacturers may produce safe and reliable products through production process inspection and comprehensive process inspection in production stage inspections in accordance with the Enforcement Regulation, Table 7, No.3-b-2)-b. B. This standard consists of general, design, manufacturing, self-inspection and obligations, and is intended to be used to assess whether the quality control system of the gas appliance manufacturing plant conforms to the requirements of undergoing production process inspection or comprehensive process inspection in production stage inspections.
2. General<Revised on December 10, 2015>	
A. Organization	
(1)	The organization shall be an organization which has technical and business capability to produce products satisfactory to customers and statutory requirements.
(2)	The top management shall guarantee that processes and procedures required for quality control system have been established and are being implemented and maintained.
(3) 【Comprehensive】	Research and development organizations including the followings shall be maintained to study various failure forms which can appear in design process or after extended use and reflect them to design. (a) Person in charge of research and development and personnel (b) Appropriate facilities and equipment required for research and development
B. Quality Control	
(1)	The manufacturer shall establish, document and implement a quality control system in accordance with the requirements of this standard.
(2)	When any change in the quality control system is planned and made, the safety of the system shall be maintained and the system shall be updated through continuous improvement.
(3)	The top management shall present the evidences of development and implementation of the quality control system and continuous improvement of its effectiveness through the followings: (a) Establishment of quality policy and quality target (b) Implementation of management review (effectiveness of quality system and improvement of products)
(4) <Newly established on December 10, 2015>	Documents necessary for quality system should be managed and documented process necessary for the management of followings should be established. (a) Approval, review, renewal and re-approval of document (b) Management in identification and distribution of document (latest edition, outsourced documents) (c) Prevention on the misuse of nullified documents
C. Human Resources	
(1)	Persons affecting product quality shall be qualified on the basis of appropriate educational background, training, expertness and experiences, and the manufacturer shall implement the followings in accordance with the written procedures: (a) Decision on the qualification of personnel (b) Provision of education and training to satisfy qualification requirements and assessment of its effectiveness (c) Maintenance of the appropriate records of qualification matters
(2) 【Comprehensive】	In the case of persons in charge of design and development of products, it shall be assured that they are skillful with the tools and in the techniques to satisfy and apply the

	design and development requirements.
D. Facilities and Equipment	
(1) 【Interval】	Facilities, equipment and business environment required to conform to the product requirements shall be determined, secured and maintained. (a) Buildings, business places and utility (b) Process equipment (hardware and software) (c) Supporting services (transportation, communication, etc.)
(2) 【Interval】	The sites shall be maintained in a neatly arranged and clean condition to conform to the requirements of products and manufacturing process.
(3) 【Comprehensive】	Means to minimize potential hazards to employees shall be manifested in design, development and manufacturing activities.
3. Design	
A. Design and Development	
(1) 【Comprehensive】	Design and development capability shall be secured to materialize products in conformity to product requirements.
(2) 【Comprehensive】	The output of product design shall be provided in a form verifiable for the requirements, be approved before distribution, and include the followings: (a) Analysis results such as failure mode effect analysis and reliability results (b) Characteristics of the product, and specification when required (c) Measures to prevent malfunctioning of the product, if applicable (d) Definition of the product including drawings or mathematical basic data, and (e) Review results of product design.
(3) 【Comprehensive】	The output of process design shall be provided in a form verifiable for the requirements, be approved before distribution, and include the followings: (a) Drawings and specifications when required (b) Manufacturing process flow diagram and layout (c) Analysis results such as failure mode effect analysis, etc. (d) Control plan (e) Work manual (f) Acceptance criteria for process approval (g)Methods for detection of product/process unconformity and feed back
(4) 【Comprehensive】	The appropriateness of design and development shall be checked, and the records of the results of appropriateness check and all necessary measures shall be maintained.
(5) 【Comprehensive】	Changes in design and development shall be able to easily grasped and the record shall be maintained. Changes shall be reviewed, verified, checked for their appropriateness and approved before their implementation, when applicable.
4. Manufacturing	
A. Purchase	
(1) 【interval】	Inspection or other activities required to ensure that purchased materials satisfy their specified purchase requirements shall be determined and implemented.
(2)	Suppliers shall be selected on the basis of their capability to supply materials in conformity to the specified purchase requirements. The selection standard shall be established and all records related to the selection shall be maintained.
(3) 【Comprehensive】	Suppliers shall be regularly evaluated, their evaluation results shall be reflected in the purchase policy, and the management methods of suppliers shall be accordingly differentiated.
B. Production	
(1)	The manufacturer shall plan and implement production in the management conditions including the followings: (a) Use of work manuals as required (b) Use of appropriate equipment (c) Measurement (d) Application of acceptance standard for judgment of process approval

(2) 【interval】	The manufacturer shall identify the states of products in connection with the measurement requirements in manufacturing stages.
(3) 【Comprehensive】 【interval】	The manufacturer shall identify the states of products in connection with the measurement requirements and traceability in manufacturing stages.
(4) 【interval】	Work preparation shall be verified whenever the work is initially started, the material is replaced or the work is changed.
(5) 【Comprehensive】	An appropriate statistical technique for each process shall be determined before mass production and be included in the control plan. Basic concept such as distribution and process capacity shall be utilized in the overall organization.
(6) 【Comprehensive】	The manufacturer shall establish and maintain the control plan in consideration of analysis results such as failure mode effect analysis in products and manufacturing processes.
(7) 【Comprehensive】 【interval】	Written work manuals shall be prepared for all personnel affecting product quality. These manuals shall be readily available for reference on working sites.
(8) 【Comprehensive】	The manufacturer shall grasp major processes and provide resources for preservation of machines, equipment, jigs and tools, and develop an overall preventive maintenance system. The system shall include the followings: (a) Planned maintenance activities (b) Packing and preservation of equipment, tools and gauges (c) Availability of replaceable parts for major manufacturing equipment (d) Documentation, evaluation and improvement of maintenance activities (e) Identification specifying the states of production, repairs or disposal
5. Self-Inspection	
A. Inspection Method and Procedure	
(1) 【interval】	The manufacturer shall determine the inspections to be performed and check whether the products conform to the specified requirements. The inspections shall be performed in relevant stages of production process.
(2) 【interval】	The evidence that inspected products conform to the acceptance criteria shall be maintained. The person who approves the shipment of the products shall be specified in the record.
(3) 【Comprehensive】 【interval】	The acceptance criteria for tally data sampling shall be of zero-defect.
(4) 【interval】	Measurements shall be made in such a way as to meet the requirements, and the measurement equipment shall be as follows to assure effective results: (a) Measurement equipment shall be calibrated or verified to the measurement standards traceable to the international or national standard at specified intervals or before application. In case such standards are not available, the bases for such calibration or verification shall be recorded. (b) Identification to judge the calibrated state (c) Protection from any manipulation which may invalidate measurement results (d) Protection from damage or deterioration during handling, maintenance and safekeeping

(5) 【interval】	The records of calibration and verification results shall be maintained, and the measured values shall be used in calibrated states.
(6) 【Comprehensive】	Changes in measurement systems indicated in the various results of measurement and test shall be analyzed by statistical methods.
(7) 【interval】	The manufacturer shall inspect the whole items of design stage inspection once a year or more often and maintain the records.
(8) 【Comprehensive】 【interval】	The manufacturer shall inspect the whole items of design stage inspection twice a year or more often and maintain the records. <Revised on November 17, 2014, December 10, 2015>
(9) 【Comprehensive】	The manufacturer's laboratory shall be included in the quality system documentation by specifying the following technical requirements: a) Appropriateness of personnel, equipment and facilities b) Capability to accurately conduct tests in accordance with relevant specifications c) External laboratories to be authorized in accordance with KS Q ISO IEC 17025 or an equivalent standard <Revised on November 17, 2014>
B. Corrective and Preventive Measures	
(1) 【interval】	It shall be assured that unconformable products and suspicious products are identified and separately managed.
(2)	Measurements shall be taken to prevent recurrence of unconformity and the followings shall be specified in the written procedure: (a) Review of unconformity (inclusive of customer complaints) (b) Determination, implementation and recording of corrective measures
(3)	The effectiveness of quality system shall be continuously improved through the utilization of quality policy, quality target, audit results, data analyses, corrective measures, preventive measures and management review.
(4)	Preventive measures shall be taken to remove the potential causes of unconformity to prevent its recurrence.
C. Internal Audit	
(1)	The manufacturer shall conduct internal audits at planned intervals to check whether the quality system is effectively implemented and maintained.
(2)	Responsibility for and requirements of planning and implementation of audits, guarantee of the independence of audit, report of audit results and maintenance of records shall be specified in the written procedure.
6. Obligations <Revised on December 10, 2015>	
A. Acceptance Marking	
(1) 【interval】	The manufacturer shall maintain a written management regulation on acceptance marking (certificates or stamps), the record of awards, use, safekeeping and disposal of the acceptance marks shall be immediately updated and maintained, and the management regulation shall include the followings: (a) Handling of acceptance marks (certificates or stamps) by authorized persons only (b) Use of acceptance marks subject to the approval of top management/management representative and in accordance with the planned procedure. (c) Record of the use of acceptance marks in detail (d) Establishment of a plan to prevent the misuse of acceptance marks, and (e) Safekeeping of acceptance marks to prevent their damage or robbery
(2) 【Comprehensive】 【interval】	The regulation on manufacturing of acceptance marks shall be separately documented, and all matters related to the manufacturing and change of acceptance marks shall be recorded and updated.
B. Safety Control	
(1)	For recent one year, the manufacturer shall be free from any accident due to product defects and there shall be no unconformity case in the sampling inspection undergone by the manufacturer.

(2) 【Comprehensive】	For recent three years, the manufacturer shall be free from any accident due to product defects and there shall be no unconformity case in the sampling inspection undergone by the manufacturer.
C. Others	
(1)	When any case which may cause the quality deterioration of products or serious harm to the user breaks out, the manufacturer shall take appropriate measures.
(2)	When there is any important change in the operation of the manufacturer's quality system, the manufacturer shall inform Korea Gas Safety Corporation of the change within 15 days.

[Remarks]

1. 【Comprehensive】 means that the paragraph is applicable only to the objects of comprehensive process inspection.
2. 【Interval】 means that the paragraph is applicable to the inspection to be performed according to its inspection interval.
3. Paragraphs without any mark are common provisions for production process inspection and comprehensive process inspection.

Appendix B Method for Test of Brass Ball Valves among Other Valves for Pipes

<table>
<tr><td colspan="2">B1. Gas resistance performance (3.8.2.1)</td></tr>
<tr><td>Gas resistance performance</td><td>1. Test condition
(1) Liquefied petroleum gas shall be No.1 (for household and commercial) for this use.
(2) Iso-octane of which content is not less than 98% shall be used.
(3) Parts cut into appropriate states shall be used as the test specimens.
(4) The arithmetic average value of three measured values shall be regarded as the test result.
(5) The weight of a test specimen shall be measured down to 1 mg.

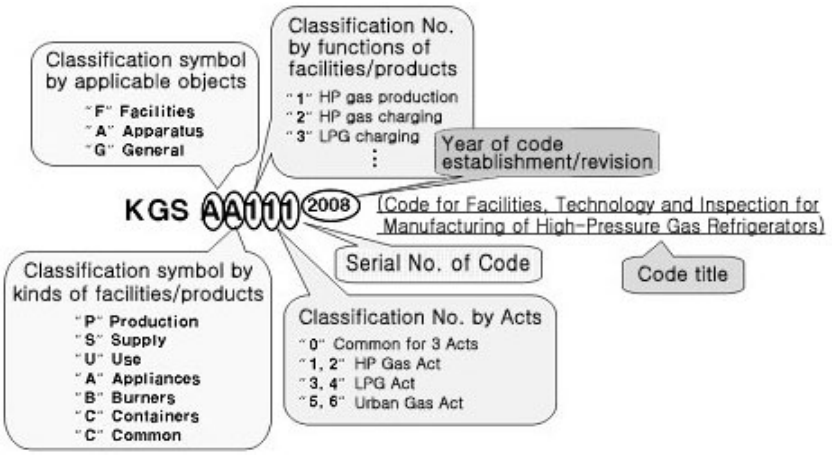
2. Test method
(1) The test specimen shall be immersed in test liquid after its weight (W_0) has been measured.
(2) The test specimen shall be immersed at a specified temperature for a specified time.
(3) The test specimen shall be taken out and left alone in the air for five minutes and then the weight (W_1) is measured.
(4) The weight (W_2) shall be measured after the specimen has been left alone in the air for 24 hours.

$$\text{Absorption rate}\ (\%) = \frac{(W_1 - W_2)}{W_0} \times 100$$

$$\text{Extraction rate}\ (\%) = \frac{(W_0 - W_2)}{W_0} \times 100$$
where,
W_0 : initial weight of test specimen (g)
W_1 : weight of test specimen after being left alone for five minutes after immersion (g)
W_2 : weight of test specimen after being left alone for 24 hours after immersion (g)</td></tr>
</table>

Symbol and Serial Number System of KGS Codes

Korea Gas Safety Codes (KGS Codes) are the codes of detailed standards for technical matters such as facilities, technology and inspection stipulated in gas-related laws and regulations and are the technical standards in gas safety areas deliberated and resolved to be adopted by the gas technical standards committee, and approved by the Ministry of Knowledge Economy.



Classification		Symbol	Facility
Apparatus **(A)**	**A**ppliances **(A)**	AA1xx	Refrigerators
		AA2xx	Piping
		AA3xx	Valves
		AA4xx	Pressure regulators
		AA5xx	Hoses
		AA6xx	Alarm & shutoff devices
		AA9xx	Other appliances
	Burners **(B)**	AB1xx	Boilers
		AB2xx	Heaters
		AB3xx	Ranges
		AB9xx	Other burners
	Containers **(C)**	AC1xx	Tanks
		AC2xx	Cylinders
		AC3xx	Cans
		AC4xx	Composite containers
		AC9xx	Other containers

Classification		Symbol	Facility
Facilities **(F)**	**P**roduction **(P)**	FP1xx	High-pressure gas manufacturing facilities
		FP2xx	High-pressure gas filling facilities
		FP3xx	LP gas filling facilities
		FP4xx	City gas wholesales manufacturing facilities
		FP5xx	City gas general manufacturing facilities
	Supply **(S)**	FS1xx	High-pressure gas sales facilities
		FS2xx	LP gas sales facilities
		FS3xx	LP gas complex supply facilities
		FS4xx	City gas wholesales supply facilities
		FS5xx	City gas general supply facilities
	Use **(U)**	FU1xx	High-pressure gas storage facilities
		FU2xx	High-pressure gas burning facilities
		FU3xx	LP gas storage facilities
		FU4xx	LP gas burning facilities
		FU5xx	City gas burning facilities
General **(G)**	**C**ommon **(C)**	GC1xx	Basic matters
		GC2xx	Common matters

KGS AA336 2018

Published by Korea Gas Safety Corporation